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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/519,743	08/25/2005	Sergio Debernardi	9526-47 (161023)	9279
30448	7590	12/02/2009		
AKERMAN SENTERFITT P.O. BOX 3188 WEST PALM BEACH, FL 33402-3188			EXAMINER WU, IVES J	
			ART UNIT 1797	PAPER NUMBER
			NOTIFICATION DATE 12/02/2009	DELIVERY MODE ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

ip@akerman.com

**Office Action Summary****Application No.**

10/519,743

**Applicant(s)**

DEBERNARDI, SERGIO

**Examiner**

IVES WU

**Art Unit**

1797

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 06 October 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/CD)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

#### **DETAILED ACTION**

(1). Applicants' Request-for-Continued Examination (RCEX), Amendments and Remarks filed on 10/6/2009 have been received.

Claim 1 is amended.

The 112 1<sup>st</sup> rejections of claims 1-10 in prior Office Action dated 4/6/2009 is withdrawn in view of present Amendments.

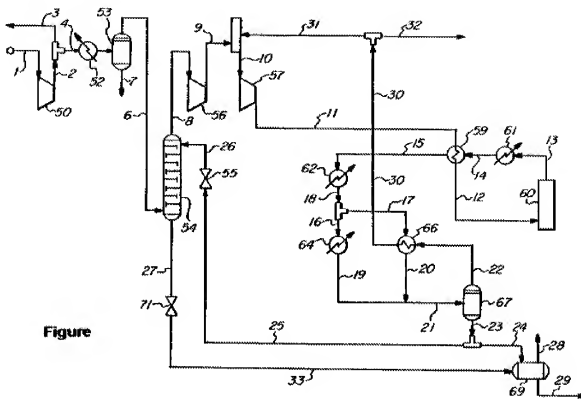
An Office Action is presented in response to the RCEX.

#### ***Claim Rejections - 35 USC § 103***

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

(2). **Claims 1-10** are rejected under 35 U.S.C. 103(a) as being unpatentable over Moore (WO 01/66465A1) as applied to claim in view of Bendix et al "Results and Experiences on Revamping of Large-Scale Ammonia Single-Line Plants", page 227, 1989, Torkilden et al (WO 99/13963), evidenced by Leverett (US 6019820A).

As to Method for ammonia production through a catalytic reaction of pressurized synthesis gas in an appropriate compressor with many stages, each of which is equipped with an inlet and outlet for synthesis gas, which method includes a purification step through liquid ammonia of synthesis gas from water and carbon dioxide contained in it in **independent claim 1**, Moore (WO 01/66465A1) discloses ammonia synthesis process and apparatus for use therein (Title). As illustrated in the following diagram, which include several stages of compression and inlet, outlet for each compressor, a dehydrator 54 with liquid ammonia from line 25 to contact synthesis gas from line 6 for purification.



**Figure**

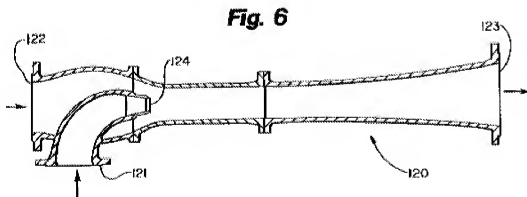
As to step of arranging a gas-liquid mixer in fluid communication, on one side with the outlet of 1<sup>st</sup> stage of compressor or with the outlet of an intermediate stage thereof and, on the other side, with the inlet of a stage immediately following 1<sup>st</sup> stage or intermediate stage, mixer having a portion of reduced cross section, extending for a prearranged axial length in method in **independent claim 1**, Moore (WO 01/66465A1) discloses dehydrator 54 to be one of any number of known gas-liquid contacting devices that bring gas and liquid phases into intimate contact with each other for the purpose of a diffusion exchange (page 9, line 7-9). Moore **does not teach** the gas-liquid mixer as claimed.

However, Bendix et al "Results and Experiences on Revamping of Large-Scale Ammonia Single-Line Plants"- page 227, last paragraph, **teach**, before coming to the additional reactor the make-up synthesis gas has to be dried by a technology developed by ACP together with Chemoprojekt Prague. For that purpose, liquid ammonia is added to the gas from the discharge side of the 3<sup>rd</sup> stage of synthesis gas compressor in a venturi tube.

The advantage of using Venturi mixing tube is to get a turbulent mixing to be intense and results in extremely efficient gas liquid contact. The mixing regime is preferably turbulent shear layer mixing. The liquid entrained in the gas may be in the form of droplets for gas continuous fluid phase distribution. The efficient mixing means that absorption can take place very rapidly and in a relatively small amount of solvent compared to that required in conventional absorption columns. This in turn means that the liquid duty in the equipment is dramatically reduced resulting in a consequential reduction in the size of any downstream regeneration section. At the same time, the mixing system used is simple and inexpensive compared to prior art systems, leading to reduced costs (page 2, line 10-23 as in Torkildsen).

Therefore, it would have been obvious at time of the invention to install Venturi tube and its downstream separator disclosed by Bendix et al for the dehydrator of Moore in order to attain the above-cited advantage. Moreover, the dehydrator disclosed by Moore is genus, the Venturi tube disclosed by Bendix et al is species, one of ordinary skills in the art would recognize that all species work well for genus, motivated by a reasonable expectation of success. *In re O'Farrell*, 853 F.2d 894, 903, 7 USPQ2d 1673, 1681 (Fed. Cir. 1988).

As to step of axially feeding into mixer a flow of synthesis gas outbound from 1<sup>st</sup> stage or from intermediate stage at the same time as a flow of liquid ammonia flows being coaxial and in co-current in method in **independent claim 1**, as illustrated in Figure 6 of Torkildsen et al (WO 99/13963), which reads on this limitation of instant claim.



As to step of creating a compression of such flow of reactant gases inside the mixer in independent claim 1, Torkildsen et al (WO 99/13963) disclose Fig.6 which shows a jet pump 120 comprising a 1<sup>st</sup> fluid inlet 121 for the high pressure fluid and a 2<sup>nd</sup> fluid inlet 122 for the

low pressure fluid (page 10, line 6-15), in view of substantially identical liquid mixer disclosed by prior art and by Applicants, it appears that the compression by liquid on gases would be generated inherently. As is evidenced by liquid jet compressor of Leverett (US 6019820).

As to step of separating substantially anhydrous synthesis gas from the mixture of flows outbound from mixer and sending gas into stage following 1<sup>st</sup> stage or intermediate stage in method in **independent claim 1**, both Figure 8 of Bendix et al and Figure 1 of Torkildsen et al disclose the separator downstream of the Venturi tube mixer.

(3). **Claims 2-10** are rejected under 35 U.S.C. 103(a) as being unpatentable over Moore (WO 01/66465A1) as applied to claim in view of Bendix et al "Results and Experiences on Revamping of Large-Scale Ammonia Single-Line Plants", page 227, 1989, Torkildsen et al (WO 99/13963) for the same rationale recited in prior Office Action dated 7/16/2008.

#### ***Response to Arguments***

(4). Applicant's arguments filed on 10/6/2009 have been fully considered but they are not persuasive.

Applicant argues that a person skilled in the art would not have replaced both the bubble cap tray dehydrator and the reduce valve 55 with the Venturi mixer of Bendix and Torkildsen. There is no incentive in the prior art to make such a replacement. Bendix and Torkildsen simply show that the Venturi tube was known (§4, page 4, present Remarks). In any case, even the combination of two documents does not render the claims obvious. Bendix and Torkildsen disclose a jet pump for mixing natural gas with a suitable solvent or reagent for removing CO<sub>2</sub> and other acid gas components, and no hint can be seen towards the use of the jet pump to effectively wash ammonia make-up synthesis gas with a liquid ammonia, obtaining an efficient washing and at the same time a compression of gas (§2, page 5, present Remarks).

Firstly, the pressure reduce valve 55 is used in conjunction with the dehydrator – bubble cap trays disclosed by Moore (WO 01/66465A1), in combining, the Venturi mixer disclosed by Bendix and Torkildsen (WO 99/13963) would replace the reduce valve 55 and bubble cap tray dehydrator together.

Secondly, the advantages of using Venturi jet tube for mixing is recited by Torkildsen et al (WO 99/13963). Therefore, the motivation of combining prior arts is obvious.

Lastly, Bendix et al "Results and Experiences on Revamping of Large-Scale Ammonia Single-Line Plants" already disclose the use of ammonia liquid jet in the Venturi tube to get gas dry (page 227) which includes the H<sub>2</sub>O in the gas phase. Therefore, the combining is proper.

### *Conclusion*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to IVES WU whose telephone number is (571)272-4245. The examiner can normally be reached on 8:00 - 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Duane Smith can be reached on 571-272-1166. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Examiner: Ives Wu

Art Unit: 1797

Date: November 23, 2009

/Duane Smith/  
Supervisory Patent Examiner, Art Unit 1797